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Surgery-First or Orthodontics-First: An Orthodontic "To Be or Not to Be" —A Narrative Review

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Abstract

The decision between a Surgery-First Approach (SFA) and conventional Orthodontics-First protocols in orthognathic surgery represents a critical clinical dilemma. While SFA is sometimes perceived as a modern innovation, it revisits historical practices with renewed emphasis on patient-centered outcomes. Traditional workflows involve presurgical orthodontic decompensation, surgery, and postsurgical orthodontics, which can prolong treatment and temporarily compromise facial aesthetics, impacting patients' psychological well-being. SFA eliminates the presurgical phase, enabling immediate skeletal correction and early aesthetic improvement, with dental alignment completed postoperatively. This narrative review synthesizes current evidence on SFA, including indications, limitations, protocols, and the influence of 3D surgical planning on treatment predictability. An electronic search of PubMed and Scopus was performed using tailored keywords for each database, including all peer-reviewed English-language studies without restriction on study design or geography, while excluding syndromic or exceptional cases. SFA is most suitable for patients with mild to moderate crowding and well-coordinated arches, with molar relationships guiding surgical planning. Key advantages include shorter overall treatment time in non-extraction cases, immediate improvement of facial profile, and enhanced patient satisfaction, supported by the Regional Acceleratory Phenomenon facilitating post-surgical tooth movement. Limitations include potential mandibular relapse and reduced postoperative stability compared with conventional protocols, particularly in complex or extraction cases. Optimal outcomes require careful case selection, precise surgical-orthodontic coordination, and appropriate fixation strategies. As advances in 3D planning continue, SFA offers an efficient, patient-centered alternative to traditional workflows,

balancing treatment speed, aesthetic results, and functional stability.

Subject Areas

Dentistry

Keywords

Orthognathic Surgery, Surgery-First Approach, Orthodontics-First Approach

1. Introduction

Surgery-first or orthodontics first…a dilemma that echoes like an orthodontic "to be or not to be". While we may think that the surgery-first approach is a modern treatment strategy, it's actually a revisitation of historical orthognathic practices. Over time, orthodontic innovations have facilitated precise three-dimensional repositioning of teeth, which has made orthognathic surgery rely on orthodontics to better the predictability of treatment outcomes [1]. Conventionally, orthodontic cases involving orthognathic surgery follow the classical workflow of first orthodontic incisor decompensation, second orthognathic surgery and finally post-surgical orthodontic treatment. This treatment workflow has proven to be effective [2]; however, the cost would be the inevitable worsening of the patient's profile due to the decompensation phase [3]. As a result, patients' psychological health worsens as well, leading us to explore other techniques to prevent this.

A historical perspective reveals that in 1897, Vilray Papin Blair performed the first bilateral ostectomy of mandibular body using an extraoral approach [4]. And after publication of his case, Angle commented that a V-section should have been used, as well as cast gold splints for post-operative fixation. Noting the first communications between surgeons and orthodontists.

By 1908, the collaboration between orthognathic surgeons and orthodontists gained official recognition. This milestone was marked by Max Ballin's presentation to the American Board of Orthodontists. Dr. Pullen, the board's chairman, emphasized the significance of interdisciplinary cooperation, stating:

> "It is the first time in the history of the American Society of Orthodontists that such a clinic has been given, and we are glad to have such a record as the work which has been done so successfully for its kind as shown this morning... Now we, as orthodontists, do not pretend to tell the surgeon anything that is new to him, but there is no doubt that the medical profession can profit by suggestions from the dental profession, and vice versa, and by this cooperation, we will further and better our practices and benefit humanity thereby." [1].

Despite these historical advances, conventional presurgical orthodontic workflows have a notable drawback: worsening of the patient's appearance during the

presurgical phase, coupled with the extended overall treatment duration [5]. This limitation has prompted a re-evaluation of older approaches, emphasizing the correction of the patient's aesthetics from the outset.

The first documented conceptual suggestions of pre-orthodontic surgery started in 1985 by Skaggs, followed by Behrman in 1988 and Brachvogel *et al.* in 1991. It was not until 2009 that these ideas were clinically put into practice by Nagasaka *et al.*, publishing the collaborative approach they took between orthodontists and surgeons [6].

This article aims to provide a review of the surgery-first approach (SFA) in orthognathic surgery by going back to the basics of indications, limitations and potential risks by discussing the implications of advanced 3D planning technologies in improving treatment predictability. This is designed for clinicians to evaluate SFA's applicability for patient-centred outcomes.

2. Methods

This narrative review was conducted following the PICO (Population, Intervention, Comparison, Outcome) framework, including patients with skeletal Class II or III malocclusions undergoing orthognathic surgery (Population), comparing the Surgery-First Approach (Intervention) with the conventional Orthodontics-First Approach (Comparison), and evaluating treatment duration, stability, esthetic outcomes, and patient satisfaction (Outcomes). An electronic search of PubMed and Scopus was performed without time restriction until January 2025, using the keywords: ("orthognathic surgery" OR "jaw surgery") AND ("orthodontics" OR "orthodontic treatment") AND ("surgery-first approach" OR "early orthognathic approach" OR "SFA") OR ("orthognathic surgery" OR "jaw surgery") AND ("orthodontics" OR "orthodontic treatment") AND ("conventional orthognathic approach" OR "orthodontics-first approach"), with the equation adapted to each database syntax.

Only peer-reviewed articles published in English were considered, with no restrictions on study design or geographic origin to provide a comprehensive overview typical of a narrative review. Studies were excluded if they reported on syndromic cases or rare/exceptional cases unlikely to reflect general clinical practice.

A total of 387 records were initially identified. After removing duplicates, 237 articles were screened. Based on title and abstract reading, 66 articles were selected for further evaluation. Following full-text reading and application of inclusion and exclusion criteria, 17 articles were finally included in this review.

As this is a narrative review, the methodology outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was not applied and methodological quality assessment of included articles was not undertaken.

3. Results

3.1. Surgery-First Approach Proposed Protocol

What sets the SFA apart from the conventional approach is that there is no need

for pre-surgical orthodontics. This means that ideally the direction of dental compensation during surgery must be consistent with the adjustments to be made in the post-surgical orthodontic phase [1]. The malocclusion correction is only addressed in the post-surgical orthodontic phase [7]. However, in some cases, minor adjustments may be needed for 1 to 2 months to resolve occlusal interferences [1]. Therefore, it is proposed to opt for SFA for patients with mild to moderate dental crowding, generally defined as less than 4 mm of tooth size–arch length discrepancy per arch, and well-coordinated dental arches, meaning minimal transverse discrepancy (≤2 mm), stable molar relationship, and compatible occlusal planes [8].

First, before proceeding with surgery, a simulation is performed using dental models. The maxilla and mandible are positioned to establish correct molar relationships, with a positive overbite. The importance of simulation resides in enabling the clinician to preview the results. This makes it possible to efficiently plan for the post-surgical orthodontic phase.

In the conventional approach, incisor decompensation serves as a key guide for predicting the final occlusion, whereas the molar relationship acts as the primary guide in the SFA.

For non-extraction cases or cases involving the extraction of bimaxillary first premolars, the molar relationship is adjusted to a Class I relationship. In patients with extracted mandibular first premolars, the molar relationship is set to Class III, while in patients with extracted maxillary first premolars, it is adjusted to Class II.

To ensure proper fixation during surgery, different techniques may be used involving the placement of a surgical arch bar, anchor screws, light round or rectangular wires (with or without anchor screws or plates), or conventional passive rectangular wires with surgical hooks (with or without anchorage screws) [9].

Following the establishment of the molar relationship, the overjet is assessed. Orthodontic treatment can begin 1 week to 1 month postoperatively to take advantage of the accelerated orthodontic tooth movement phenomenon [6]. Liou *et al.* established specific guidelines for certain clinical situations, summarized in **Table 1**.

3.2. Surgery-First versus Conventional: Which Approach Wins?

Having explored the concept of the surgery-first approach and its proposed protocol, one critical question arises for every clinician: why change a therapeutic approach that has proven effective? Is it truly worthwhile to navigate a learning curve, face new challenges, and adapt after years of honing and perfecting established skills?

In the conventional orthognathic surgical approach, the presurgical dental decompensation phase is time-consuming and negatively impacts patients' appearance. This negatively affects patients' quality of life and motivation to pursue the treatment further [10]. Therefore, SFA enables practitioners to provide patient-centred care, aimed at addressing the patient's primary chief complaint while minimizing disruption to their social and daily life [1] [7]. The immediate

Table 1. Specific recommendations by Liou *et al.* (2011) [11].

Class II	Moderate to deep mandibular Curve of Spee with proclined lower incisors in Class II mandibular retrognathia	- Anterior segmental osteotomy for leveling, intrusion, and mandibular advancement. - Edge-to-edge mandibular advancement with postoperative orthodontic intrusion for occlusal contact and chin projection.
Class III	Proclined incisive	- Maxillary first premolar extraction combined with anterior segmental osteotomy. - Clockwise mandibular rotation with Le Fort I osteotomy to correct upper incisor inclination.
	Moderately retroclined incisors with crowded lower anterior incisors	Set up a Class I molar relationship with excessive incisor overjet, followed by postoperative alignment of lower incisors to achieve normal overjet.
	Severely retroclined incisors with crowded lower anterior incisors	Extraction of lower first premolars and anterior segmental osteotomy, with Class III molar relationship and excessive incisor overjet, followed by postoperative alignment of lower incisors for normal overjet.
	Moderate to deep mandibular Curve of Spee	Level the spee curve preoperatively or surgically with anterior segmental osteotomy to prevent upward and forward mandibular rotation.
Transverse coordination	Wide maxilla with a transverse discrepancy exceeding one molar width on each side	Surgical coordination with a 3-piece Le Fort I osteotomy.
	Wide maxilla with a transverse discrepancy less than one molar width on each side	Coordination by postoperative orthodontic tooth movement.
	Narrow maxilla	Surgically assisted rapid palatal expansion.

improvement of patients' appearance is a fundamental advantage of SFA, Yang L *et al.* consider the impact on the patient's quality of life may increase patients' confidence to undergo treatment [10].

SFA is mainly praised for its reduced treatment time, which can be attributed to the post-surgical dental decompensation, aligns with the gradual adaptation of teeth and muscles to the new skeletal structures. This dynamic, combined with the normalization of surrounding tissues, promotes and facilitates subsequent orthodontic movements [7] [9]. It is also believed that the Regional Acceleratory Phenomenon (RAP), maximized after surgery, is a key factor in shorter orthodontic treatment times. RAP corresponds to a tissue reaction induced by a noxious

stimulus, which stimulates the healing capacity of affected tissues through increased blood flow and localized cellular activity through bone turnover driven by surgery, which facilitates the progression of orthodontic corrections [1] [7] [12]. Regarding the shortened treatment time, there is ongoing debate. A review by Mirhashemi *et al.* reported that the mean overall treatment duration of treatment for SFA was 18.39 months compared to 23.34 months for the conventional approach [6]. However, although the presurgical phase is shorter in SFA, the postsurgical orthodontic phase is longer [10]. All in all, the treatment duration may vary depending on the clinical case, particularly in cases involving tooth extractions, which significantly extend the timeline. Mirhashemi *et al.*'s review revealed that in extraction cases, there was no significant difference in treatment duration between SFA (25.114 months) and the conventional approach (25.7 months) [6]. Consequently, SFA is more suitable for non-extraction cases to achieve optimal time efficiency.

One critical factor influencing clinicians' decision-making is postoperative stability, which remains a key point of controversy regarding the surgery-first approach. A meta-analysis by Hongpu Wei *et al.* found no significant difference in maxillary relapse between the SFA group and the conventional approach [13]. However, the relapse of the mandible was higher in the SFA group, as the mandible tends to rotate counterclockwise [13]. Consequently, it is well-established that the conventional approach generally provides greater postoperative stability than SFA. However, it has been suggested that the method of fixation and the type of surgery may affect stability in SFA. Studies have recommended the use of anchor plates to improve postoperative stability in use of class III elastics and prevent forward movement of the jaw. Recent studies, however, indicate that SFA can achieve skeletal stability comparable to conventional approach when appropriate protocols are applied. Li *et al.* (2024) reported no significant differences in linear or angular deviations between SFA with clear aligners and the orthodontic-first approach (OFA), except for a minor difference in maxillary yaw ($p = 0.005$), with a significantly reduced overall treatment duration [14]. Similarly, Mansour *et al.* (2023) observed good postoperative stability with SFA, particularly at the maxilla, with only limited mandibular relapse (forward shift of 2.5 mm and vertical or transverse changes of 1 - 2 mm) [15]. Saghafi *et al.* (2025) also found no significant difference in maxillary stability between SFA and conventional approach following Le Fort I advancement, with minimal posterior relapse and no correlation with immediate occlusal quality. Collectively, these findings suggest that, when properly executed, SFA can provide predictable skeletal stability while reducing overall treatment time [16]. **Table 2** provides a comparative summary of the quantitative findings reported in recent studies on the surgery-first approach, highlighting treatment duration, maxillary and mandibular relapse, and overall skeletal stability.

It should be noted, nevertheless, that the quality of the included studies was not formally assessed, which limits the strength of these conclusions and indicates that the findings should be interpreted with caution.

Table 2. Comparative summary of quantitative outcomes across key surgery-first approach studies.

Evaluated Aspect	Key Metrics	Implication
Mean Treatment Time	- Li *et al.*, RCT reported: SFA = 18.0 ± 2.5 months, OFA = 22.8 ± 3.6 months ≈ 4 - 5 months shorter for SFA [14]. - Other studies [3] [15] [16] qualitatively confirmed a notable reduction in total treatment duration with the surgery-first approach.	The SFA shortens overall treatment time by roughly 20% - 25% compared with the conventional orthodontics-first sequence.
Relapse / Postsurgical Stability	- Wei *et al.*, 2018 (meta-analysis, 498 patients): pooled horizontal relapse 1.50 mm greater in SFA ($p < 0.00001$) [13]. - Saghafi *et al.*, 2025: posterior maxillary relapse < 1 mm at 6 months, *no significant difference* between SFA and OFA [16]. - Mansour *et al.*, 2023: mean relapse maxilla ≈ 0.7 mm, mandible ≈ 2.5 ± 2.0 mm (largest sagittal change) [15]. - Jeong *et al.*, 2017: long-term (mean 74 months) follow-up showed no significant difference in anteroposterior stability between SFA and OFA [3].	Overall, SFA shows slightly higher relapse (≈1 - 2 mm)—mainly mandibular—but differences are small and rarely clinically relevant.
Type/ Location of Relapse	- Relapse most often occurs at the mandible (counter-clockwise rotation) [13] [15]. - Maxilla remains highly stable (relapse < 1 mm) [13] [15] [16].	Maxillary stability is good; mandibular relapse is mild and manageable when fixation and occlusion are well controlled.
Additional Quantitative Advantages	- Immediate aesthetic improvement and occlusal correction at surgery [14]. - No pre-surgical facial worsening (contrary to conventional approach) [16]. - Regional Acceleratory Phenomenon (RAP) enhances post-surgical tooth movement and may reduce orthodontic duration [16].	Immediate facial improvement, shorter overall treatment, and efficient postoperative tooth movement make SFA a clinically appealing option.

Beyond esthetic improvement and skeletal stability, functional outcomes also represent a key dimension of success in the surgery-first approach. Several studies have reported that SFA can lead to early normalization of occlusal function, improved masticatory efficiency, and enhanced airway dimensions due to immediate skeletal correction[7] [10]. Nevertheless, these benefits depend largely on precise postoperative orthodontic coordination to ensure a harmonious occlusion and muscular adaptation to the new skeletal framework.

4. Conclusion

Deciding whether to opt for the surgery-first approach or the conventional one is

not an easy decision. Beyond the clinician's preference, mastering case selection is key. While SFA prioritizes treatment time reduction and patients' aesthetic repercussions, it is not without limitations, such as the potential for increased postoperative instability. It might also not be the ideal approach for complex skeletal discrepancies or in extraction cases. This is why orthodontists must carefully weigh the benefits and drawbacks of each technique, with an emphasis on patient-centered care. Better results may be obtained as advancements in surgical 3D planning and techniques continue.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Ahmadvand, A., Alavi, S. and Mehraban, S.H. (2021) An Overview of Surgery-First Orthognathic Approach: History, Indications and Limitations, Protocols, and Dentoskeletal Stability. *Dental Research Journal*, **18**, Article 47.

[2] Leelasinjaroen, P., Godfrey, K., Manosudprasit, M., Wangsrimongkol, T., Surakunprapha, P. and Pisek, P. (2012) Surgery First Orthognathic Approach for Skeletal Class III Malocclusion Corrections—A Literature Review. *Journal of the Medical Association of Thailand*, **95**, S172-S180.

[3] Jeong, W.S., Lee, J.Y. and Choi, J.W. (2017) Large-Scale Study of Long-Term Anteroposterior Stability in a Surgery-First Orthognathic Approach without Presurgical Orthodontic Treatment. *Journal of Craniofacial Surgery*, **28**, 2016-2020. https://doi.org/10.1097/scs.0000000000003853

[4] Naini, F.B. (2016) Historical Evolution of Orthognathic Surgery. In: Naini, F.B. and Gill, D.S., Eds., *Orthognathic Surgery*, Wiley, 23-82. https://onlinelibrary.wiley.com/doi/10.1002/9781119004370.ch2 https://doi.org/10.1002/9781119004370.ch2

[5] Jacobs, J.D. and Sinclair, P.M. (1983) Principles of Orthodontic Mechanics in Orthognathic Surgery Cases. *American Journal of Orthodontics*, **84**, 399-407. https://doi.org/10.1016/0002-9416(93)90003-p

[6] Nagasaka, H., Sugawara, J., Kawamura, H. and Nanda, R. (2009) 'Surgery First' Skeletal Class III Correction Using the Skeletal Anchorage System. *Journal of Clinical Orthodontics*, **43**, 97-105.

[7] Choi, J.W. and Lee, J.Y. (2021) Current Concept of the Surgery-First Orthognathic Approach. *Archives of Plastic Surgery*, **48**, 199-207. https://doi.org/10.5999/aps.2020.01305

[8] Behrman, S.J. and Behrman, D.A. (1988) Oral Surgeons' Considerations in Surgical Orthodontic Treatment. *Dental Clinics of North America*, **32**, 481-507. https://doi.org/10.1016/s0011-8532(22)00324-x

[9] Brachvogel, P., Berten, J.L. and Hausamen, J.E. (1991) Surgery before Orthodontic Treatment: A Concept for Timing the Combined Therapy of Skeletal Dysgnathias. *Dtsch Zahn Mund Kieferheilkd Zentralbl*, **79**, 557-563.

[10] Mirhashemi, A.H., Ghadirian, H. and Samimi, S.M. (2022) Surgery-First Approach; from Claims to Evidence: A Comprehensive Review. *Frontiers in Dentistry*, **19**, Article 10594. https://doi.org/10.18502/fid.v19i23.10594

[11] Liou, E.J.W., Chen, P., Wang, Y., Yu, C., Huang, C.S. and Chen, Y. (2011) Surgery-

first Accelerated Orthognathic Surgery: Orthodontic Guidelines and Setup for Model Surgery. *Journal of Oral and Maxillofacial Surgery*, **69**, 771-780. https://doi.org/10.1016/j.joms.2010.11.011

[12] Verna, C. (2015) Regional Acceleratory Phenomenon. In: *Frontiers of Oral Biology*, S. Karger AG, 28-35. https://doi.org/10.1159/000351897

[13] Wei, H., Liu, Z., Zang, J. and Wang, X. (2018) Surgery-First/Early-Orthognathic Approach May Yield Poorer Postoperative Stability than Conventional Orthodontics-First Approach: A Systematic Review and Meta-Analysis. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, **126**, 107-116. https://doi.org/10.1016/j.oooo.2018.02.018

[14] Li, M., Shen, S., Huang, J., Wang, Y., Bao, J., Wang, B., *et al.* (2024) The Skeletal Stability of Combined Surgery First Approach and Clear Aligners in Skeletal Class III Malocclusion Correction: A Randomized Controlled Trial. *Journal of Clinical Medicine*, **13**, Article 872. https://doi.org/10.3390/jcm13030872

[15] Mansour, N.M., Abdelshaheed, M.E., El-Sabbagh, A.H., El-Din, A.M.B., Kim, Y.C. and Choi, J. (2023) Three-Dimensional Evaluation of Skeletal Stability Following Surgery-First Orthognathic Approach: Validation of a Simple and Effective Method. *Archives of Plastic Surgery*, **50**, 254-263. https://doi.org/10.1055/a-2058-8108

[16] Saghafi, H., Benington, P., Ju, X. and Ayoub, A. (2025) Is the Orthodontics-First Method More Stable than the Surgery-First Approach for Orthognathic Correction of Maxillary Deficiency? *Journal of Cranio-Maxillofacial Surgery*, **53**, 312-317. https://doi.org/10.1016/j.jcms.2024.12.011